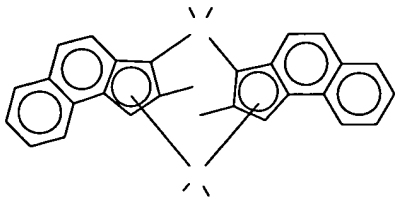
Claims:

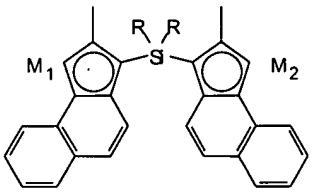
1. A process for the diastereoselective synthesis of rac-diorganosilylbis(2-methylbenzo[e]indenyl)zirconium compounds of the formula I,



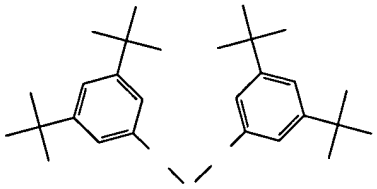
(I)

which comprises the following steps:

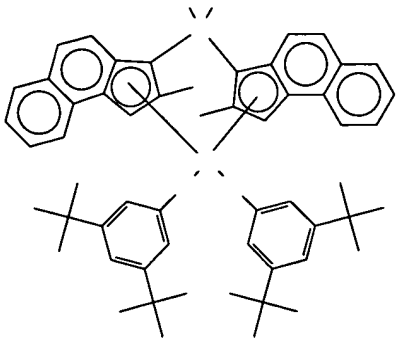
a) reaction of a compound of the formula II with a zirconium bisphenoxide complex of the formula III to form the ansa-zirconocene bisphenoxide complex of the formula IV,



(II)



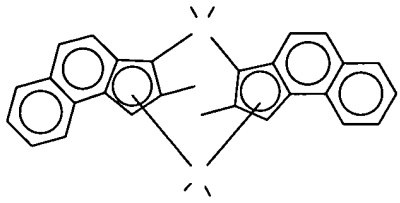
(III)



(IV)

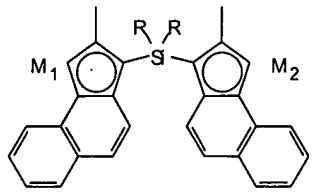
b) replacement of the phenoxide groups of IV by X using suitable replacement reagents to give the compound of the formula I;
where
the substituents X can be identical or different and are each F, Cl, Br, I, or linear, cyclic or branched C_{1-10}-alkyl; and
the substituents R can be identical or different and are each linear, cyclic or branched C_{1-10}-alkyl or C_{6-10}-aryl; and
LB is a suitable Lewis base, and
M_1 and M_2 are monovalent positive alkali metal ions or M_1 and M_2 together represent a divalent positive alkaline earth metal ion.

2. A process as claimed in claim 1 for the diastereoselective synthesis of rac-diorganosilylbis(2-methylbenzo[e]indenyl)zirconium compounds of the formula I,



(I)

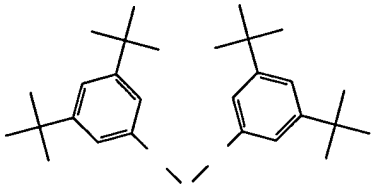
which comprises the following steps:
a) deprotonation of 2-methylbenzo[e]indene by means of a suitable deprotonating agent;
b) reaction of the deprotonated 2-methylbenzo[e]indene with a diorganosilyl compound R_2SiY_2, where the substituents R can be identical or different and are each linear, cyclic or branched C_{1-10}-alkyl or C_{6-10}-aryl and the leaving groups Y can be identical or different and are each F, Cl, Br or I, and subsequent repeat deprotonation by means of a suitable deprotonating agent, giving a compound of the formula II:



(II)

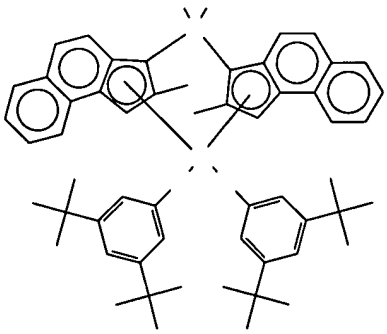
where M_1 and M_2 are monovalent positive alkali metal ions or M_1 and M_2 together represent a divalent positive alkaline earth metal ion;

c) reaction of the compound of the formula II with a zirconium bisphenoxide complex of the formula III:



(III)

where LB is a suitable Lewis base, to give a compound of the formula IV:



(IV)

d) reaction of the compound of the formula IV with suitable replacement reagents so as to replace the phenoxide groups of IV by X to give the compound of the formula I, where the substituents X can be identical or different and are each F, Cl, Br, I or linear, cyclic or branched C_{1-10}-alkyl.

3. A process as claimed in claim 2, wherein the deprotonating agent is selected from among n-butyllithium, tert-butyllithium, sodium hydride, potassium tert-butoxide, Grignard reagents of magnesium, magnesium compounds such as, in particular, di-n-butylmagnesium, (n,s)–dibutylmagnesium and other suitable alkaline earth metal alkyl and alkali metal alkyl compounds.

4. process as claimed in claim 2 or 3 carried out without isolation of intermediates after individual process steps.

5. A process as claimed in any of the preceding claims, wherein the replacement reagent used is an aliphatic or aromatic carboxylic acid halide such as acetyl chloride, phenylacetyl chloride, 2–thiophenacetyl chloride, trichloroacetyl chloride, trimethylacetyl chloride, O–acetylmandelyl chloride, 1,3,5–benzenetricarboxylic chloride, 2,6–pyridinecarboxylic chloride, tert–butylacetyl chloride, chloroacetyl chloride, 4–chlorobenzacetyl chloride, dichloroacetyl chloride, 3–methoxyphenylacetyl chloride, acetyl bromide, bromoacetyl bromide, acetyl fluoride or benzoyl fluoride, either in solvents or as such.

6. A process as claimed in any of claims 1-4, wherein the replacement reagent used is $SOCl_2$, silicon tetrachloride, methylaluminum dichloride, dimethylaluminum chloride, aluminum trichloride or ethylaluminum dichloride.

7. A process as claimed in any of claims 1-4, wherein the replacement reagent used is HF, HBr, HI, preferably HCl, either as such or as a solution in water or organic solvents such as diethyl ether, DME or THF.

8. A process as claimed in any of claims 1-4, wherein the replacement reagent used is an organoaluminum compound such as a tri-C_1-C_{10}-alkylaluminum, i.e. trimethylaluminum, triethylaluminum, tri-n-butylaluminum, triisobutylaluminum or a dialkylaluminum chloride or an aluminum sesquichloride.

9. A process as claimed in any of the preceding claims, wherein the reaction is carried out in Lewis base-containing solvent mixtures of hydrocarbons and ethers or amines or both, preferably toluene and THF, toluene and DME or toluene and TMEDA.

10. A process as claimed in claim 9, wherein the Lewis base is present in an amount of 0.01–50 mol%, preferably 0.1–10 mol%, based on the solvent mixture.

11. A process as claimed in any of the preceding claims, wherein LB in the formula III is selected from among tetrahydrofuran (THF), dimethoxyethane (DME) and tetramethylethanediamine (TMEDA).

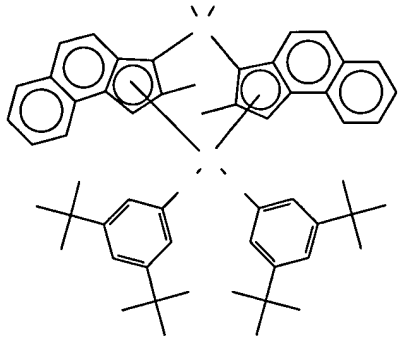
12. A process as claimed in any of the preceding claims, wherein M_1 and M_2 are selected from among lithium, sodium, potassium, rubidium or cesium ions or together represent magnesium.

13. A process as claimed in any of the preceding claims, wherein the substituents R are selected from among methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl and phenyl and combinations thereof.

14. A process as claimed in any of the preceding claims, wherein the substituents X are selected from among F, Cl, Br, I, methyl, ethyl, n-propyl, isopropyl, n-butyl and isobutyl, preferably Cl and/or methyl.

15. A process as claimed in any of the preceding claims, wherein R is methyl or ethyl, X is Cl and LB is THF or DME.

16. A racemic transition metal compound of the formula IV:



(IV)

where the substituents R may be identical or different and are each linear, cyclic or branched C_{1-10}-alkyl or C_{6-10}-aryl.

17. A compound as claimed in claim 16, wherein the substituents R are selected from among methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl and phenyl and combinations thereof.

18. The use of a racemic compound as claimed in claim 16 or 17 as a catalyst or as a constituent of a catalyst for the polymerization of olefinically unsaturated compounds or as a reagent or catalyst in stereoselective synthesis.